

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

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IN THE APPLICATION OF:

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DOCKET NO.: 3218R

CUSTOMER NUMBER: 26645

SERIAL No.: 10/621,154

EXAMINER: S. COSTALES

FILED: JULY 13, 2003

GROUP ART UNIT: 1764

**TITLE: Transmission Lubricating Compositions with Improved Performance,  
Containing Acid/Polyamine Condensation Product**

Wickliffe, Ohio

Hon. Commissioner for Patents  
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Declaration Under Rule 132

Sir,

I, James L. Sumiejski, declare as follows:

1. I received a Bachelor of Science degree in 1975 from The University of Wisconsin-Milwaukee and a Master of Science degree in the field of Organic Chemistry in 1977 from The University of Michigan. I have been employed by The Lubrizol Corporation since 1978. From 1978 to 1985 I was responsible for the development of various lubricant additives while working in the Research Division. In 1985 I was promoted to Project/Technology manager for Automatic Transmission Fluids. Since that time I have been responsible for formulating lubricants for transmission systems, including automatic transmissions, dual clutch transmissions and continuously variable transmissions. I am one of the inventors in the above-mentioned application, and I am familiar with the references which were used in the rejection thereof.

2. In order to illustrate that the composition of the invention has unexpected performance over the disclosure of Ward (WO 00/700001), the following experiments were performed under my supervision.

3. A number of lubricating compositions were prepared as summarised in the Table below. The comparative Example is Example 13 from WO 00/700001; and the examples of the invention are similar. The difference between the invention compositions is that in Comparative Example 13, no condensation product of a fatty acid and a polyamine was used. In contrast, the examples of the invention include an amount of a condensation product of a fatty acid and a polyamine. The table below highlights the amounts (including conventional amounts of diluent oil present in the commercial materials) of additives as specified in claim 1 of the present invention. The additives are:

Formulation Components (parts by weight)	Comparative Example	Example of the Invention			
		EX1	EX2	EX3	EX4
	EX13 From WO 00/70001 (CE1)				
Borated Dispersant <sup>1</sup> (wt %)	3.5	3.5	3.5	3.5	3.5
Borate Ester <sup>2</sup> (wt %)	0.2	0.2	0.2	0.2	0.2
Condensation Product of Fatty Acid with a Polyamine <sup>3</sup> (wt %)	0	0.03	0.15	0.3	1.5
Rest of additives and base oil from Example 13 of WO 00/70001	Balance to 100 wt %				

Footnote to table:

1. The borated dispersant is the product of a reaction of polyisobutylene-succinic anhydride with polyetheramines, followed by reaction boric acid. The borated dispersant contains 1.9 wt % of boron and 33 % diluent oil.
2. The borate ester is defined as a borated epoxide in Example 13 of WO 00/70001.
3. The condensation product of a fatty acid with a polyamine is prepared by reacting isostearic acid with tetraethylenepentamine.

4. Examples CE1 and EX1 to EX4 were analyzed using the test methodologies of the MERCON®V  $\mu$ -V Characterization negative slope test. The test method is described in detail in the Ford MERCON®V Specification for Automatic Transmission Fluids trademarked for service in vehicles sold by the Ford Motor Company. The intent of this test is to evaluate the low-speed anti-shudder performance of transmission fluids on an SAE No.2 Machine. The tests were carried out at Southwest Research Institute.

5. The experimental results obtained from the test are as follows:

Example	Total Test Time (hr)	Anti-Shudder Performance at End of Test	Plate Wear	
		Slope Type	Wear (mm)	Wear Visual Analysis
CE1	55	Negative	0.301	Excess plate wear and dark discoloration of plates
EX1	75	Negative	0.300	Medium plate wear and light discoloration
EX2	95	Not Negative	0.190	Light wear and light discoloration
EX3	115	Not Negative	0.153	Light wear and light discoloration
EX4	115	Not Negative	0.069	No wear and no discoloration

6. The compositions of the invention exhibited markedly less wear and improved anti-shudder performance than did the comparative composition.

7. The slope (negative versus not negative) in the Anti-Shudder performance portion of the test refers to the slope of the friction curve when torque (friction coefficient) is plotted versus speed in revolutions per minute (rpm). The slope is calculated using the ratio of the torques at 2 and 20 rpms and the ratio at 40 and 120 rpms. When these ratios exceed 1.00 the fluid is defined as having developed a negative slope characteristic. Negative slope development is an indication that the fluid will cause unacceptable shudder or vibration in the automatic transmission which can be felt by the vehicle driver. When negative slope develops in this test, the fluid is considered a fail for this particular performance requirement. The

results showed that the material of the present invention maintained a satisfactory (non-negative) slope for the 75 to 115 hour duration of the test, while the slope of the material of the comparative example became negative after 55 hours.

8. Normally, the conventionally established passing criterion for plate wear in this test would be a maximum of 0.076 mm. However, at time the tests were performed, it is believed that the batch of plates used in the test uncharacteristically exhibited more excessive wear than is commonly acceptable, resulting in an uncharacteristically severe test. Even under these severe conditions, the composition of the invention exhibited markedly less wear than did the comparative composition. Thus the wear results indicate that the presence of the condensation product of a fatty acid with a polyamine provides the clutch plates with protection during plate engagement for lock-up.

9. The results shown above indicate that the lubricating composition of the invention containing the condensation product of a fatty acid with a polyamine unexpectedly has significantly improved wear performance and anti-shudder performance compared with the comparative example.

10. I further declare that all statements herein made of my own knowledge are true and all statements herein made on information and belief are believed to be true. I understand that wilful false statements and the like are punishable by fine or imprisonment or both (18 U.S.C. 1001) and may jeopardize the validity of the application or any patent issuing thereon.



James L. Sumiejski

06/01/2007

Date